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ABSTRACT

The design rationale for the development of an exemplary, flexible online course for making accessible online courses is described. The authors developed the course by adopting the roles of content expert and instructional designer. The course has a dual purpose. The assessment for postgraduate students provides a guide to learning for academic staff development. The design and development process included the formulation of learning outcomes, assessment criteria and strategies, learning methods, and the alignment of these. The learning strategies included a variation of the cognitive apprenticeship model that was refined following feedback from prototype face-to-face workshops. Learner-centered design is fundamental and includes: high contrast text and background; no unnecessary graphics or icons; tips for people using assistive technology; avoiding the use of PDF; direct links to other course areas; text transcript for online videos; and easy access to resources for learning activities. (Contains 14 references.) (Author)

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Design and Development of a Flexible Online Course for Making Accessible Online Courses

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Abstract: The design rationale for the development of an exemplary, flexible online course for making accessible online courses is described. We developed the course by adopting the roles of content expert and instructional designer. The course has a dual purpose; the assessment for postgraduate students provides a guide to learning for academic staff development. The design and development process included the formulation of learning outcomes, assessment criteria and strategies, learning methods, and the alignment of these. The learning strategies included a variation of the cognitive apprenticeship model that was refined following feedback from prototype face-to-face workshops. Learner-centred design is fundamental and includes: high contrast text and background; no unnecessary graphics or icons; tips for people using assistive technology; avoiding the use of PDF; direct links to other course areas; text transcript for online videos; and easy access to resources for learning activities.

Project Initiation and Rationale

The production of guidelines for making online courses accessible (Pearson and Koppi, 2001), lead to considerations of developing an online course for making accessible online courses. Because the authors are at different universities, in different fields with different 'clients', the nature of the course had to be negotiated. Pearson (at the University of Teesside, UK) teaches postgraduate students and the desired accessibility module would be part of an MSc in Multimedia Design. Koppi (at the University of New South Wales, Australia) is involved with academic staff development and the course would have to help teaching staff to produce their own accessible online courses (using WebCT at UNSW).

The project development proposal had to include a rationale stating that the intended course would have the dual purpose of an MSc component and a staff development purpose. This was to prove problematic, particularly where assessment was concerned. The project proposal was based on constructivist learning principles and was structured to include learning activities, dialogue and collaboration, and student support. We decided to adopt the roles of content expert (Pearson) and instructional designer (Koppi) to help us include the essential perspectives in courseware development. The structure of this paper describing the design and development of the course is based on an instructional design plan.

We realised that the course itself would have to be an exemplar of accessible course design. We would have to ensure that it would be accessible to people with disabilities. We intended to employ the services of an experienced student who is blind, and is a regular Internet user, to assist us with identifying the capabilities of assistive technologies, and with checking the accessibility of the course. We also intended to use the checking tools provided by Bobby (CAST, 2001), DreamWeaver 4, and our own Guidelines (Pearson and Koppi, 2001) to check for accessibility.

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Formulation of Learning Outcomes

Following instructional design principles (Biggs, 1999a and b), the aims, objectives and learning outcomes were formulated first, and the learning outcomes, which are concerned with what the student will be able do, are given as follows.

"On successful completion of this module the student will be able to:

1. Discuss the issues relevant to access for people with disabilities to online learning.
2. Demonstrate skills in the use of relevant guidelines and accessibility checking mechanisms.
3. Describe the use and application of assistive technologies.
4. Describe the needs of the learner in the design of accessible online courseware.
5. Demonstrate skills in the design and development of accessible and inclusive online courseware.
6. Analyse barriers to accessibility in existing web sites and online courses."

Assessment Criteria

The assessment criteria are concerned with measuring how well the students have achieved the learning outcomes; they were formulated for each learning activity designed to produce the desired learning outcomes. For example, for the learning outcome concerned with the task investigating the guidelines based on those developed by the Web Accessibility Initiative (WAI), part of the World Wide Web Consortium (W3C), the assessment criteria together with relevant information are given as:

"If you are being assessed for this course, your portfolio contribution for this activity will be assessed according to the following criteria. If you are carrying out this task out of interest or for your personal development, the criteria can be used as a checklist for your own learning.

1. The extent to which you have considered the purpose and the extent of the activities of W3C and WAI.
2. Your analysis if the applicability of W3C guidelines for accessible web site design to the average non-technical academic developer.
3. Evidence of research and understanding of the nature of other guidelines.
4. Quality of the overall presentation and coherence of the posting and additional links.
5. The quality and coherence of your contribution to the discussion of this topic.
   Marked out of 100% with 20% for each element."

As indicated above, this online course has a dual purpose (part of a postgraduate degree and for staff development), and so the assessment criteria can be used in different ways. The criteria can be used for summative assessment (portfolio) in the case of the students, and as a learning guide in the case of teaching staff learning about accessibility. The students can also use them as a learning guide because the assessment criteria are provided with each learning task.

Assessment Strategy

Types of Assessment

The assessment strategy is concerned with the methods of assessment that are best suited to the students demonstrating that they have achieved the learning outcomes. There are many ways of assessing learning and McLoughlin and Luca (2001) note that there are three types of assessment:

- **Cognitive** : thinking, knowledge, application and understanding of principles, concepts
- **Performance**: demonstration of skills and abilities, complex task performance
- **Portfolios**: evidence of complete student record, tasks, achievement, examples of work etc.

Of course, these three types are not exclusive, e.g., a portfolio would include evidence of cognitive and performance attainment. For academic staff undergoing staff development in inclusive courseware design, and for postgraduate students learning about courseware design, the most appropriate types of assessment would be

performance and portfolios since we would want to see practical examples of work as evidence of learning and application of inclusive and accessible principles.

The portfolio is used as half of the assessment and is described as follows.

"You should develop a portfolio by posting to the Student Presentations area or your personal topic area in the discussion forum, to demonstrate understanding of issues related to disability, including:

1. The Disability Discrimination Acts and their effect on education and online learning.
2. Review of current guidelines and their usefulness for academic developers.
3. Review of assistive technologies.
4. Accessibility checking tools, their use and application, reviews of good/bad examples of websites.
5. Design methods and tools for creating accessible documents and courses.

This assessment will take place throughout the module and will be directly linked to the activities you undertake through the course."

The other half of the assessment is concerned with the students or staff either (a) creating or modifying an accessible and inclusive course based on their own subject expertise, or (b) redesigning a given course (especially prepared from common practices) which does not meet accessibility requirements. Participants have the option of working in groups or as individuals in carrying out the tasks.

Authentic Assessment

In addition to the learning outcomes, assessment criteria and assessment strategies being aligned, the assessment tasks should also be authentic. Herrington and Herrington (1998) in their review of authentic assessment provide descriptors such as: situated, practical, realistic, performance-based, real-world, and ill-structured. The use of real-world learning environments enables the same activity to be used for learning and assessment (Herrington and Oliver, 2000). For example, the assessment of how well teachers are able to design and develop an accessible online environment is their production of an accessible online course or their redesign of an inaccessible course, as described above.

In the real world, work is often collaborative in nature and authentic tasks should include collaborative activities wherever possible (as in this course). If well designed, collaborative work can enhance the learning experience and the social negotiation that promotes higher order thinking (Herrington and Oliver, 1999). In the course, discussion topics are used to facilitate collaboration and the presentation of alternative viewpoints.

Learning and Teaching Strategy

The learning and teaching strategy is concerned with the methods will best help students achieve the learning outcomes. Having formulated the learning outcomes and assessment strategy and criteria, it follows that the learning tasks should be considered and that they should all be in alignment. This section presents a rationale for the learning tasks employed.

Cognitive apprenticeship model

The cognitive apprenticeship approach (Brandt *et al.*, 1993), when coupled with participation in the community of practice (Lave and Wenger, 1991) and authentic problem-based learning (Savery and Duffy, 1995; Grabinger and Dunlap, 2000), can provide an authentic situated learning experience that bridges the gap between abstract theory and effective practice (Herrington and Oliver, 2000). With respect to designing accessible learning environments, the intention is for the teachers to apply the theory in their everyday practice and not to treat it only in the abstract. Learning, online or otherwise, can be facilitated by the use of scaffolding (support) in a social constructivist setting (Roehler and Cantlon, 1997).

We decided to adapt the five stages of the cognitive apprenticeship model (Brandt *et al.*, 1993) as follows.

Phase 1 We elected to present the expert perspective through an interview (Koppi interviewed Pearson) which was filmed and converted to streaming video. The five major issues (as identified in the learning outcomes) and expert considerations were discussed (Pearson and Koppi, 2002). The video sets the scene for the five learning tasks corresponding to the first five learning outcomes.
Phase 2 Working in groups, the participants carry out the learning activities and discuss their findings and conclusions.
Phase 3 As an authentic activity, the participants apply what they have learned to the design and construction of their own online learning environment (e.g., using WebCT) or to the redesign of an existing problematic one already prepared by us.
Phase 4 The learners continue developing their websites in their own time and check that their sites conform to acceptable standards (e.g. by using the Bobby and DreamWeaver software). Postgraduate students carry out the assessment already detailed – redesign of inaccessible course or design/re-design a proposal for their own course or web site.
Phase 5 The learners may each reflect on what they have learned and describe general principles for developing accessible online learning environments. Students illustrate their learning by creating a portfolio of their accessible designs and implementations that contribute to their assessment. Academic staff could organise and facilitate a workshop in their own department or school.

Face-to-Face Workshop Prototypes

We developed face-to-face workshops on accessibility for academic staff, with the intention of using the workshop tasks as prototypes for the online tasks. The workshops enabled us to see how the learning tasks worked, how long they took, what the problems were, and to obtain feedback from the participants. We modelled the workshop along the lines of the online course: orientation introduction, activities, reporting back, with support from the workshop facilitator. We were in effect doing evaluation of the intended online tasks in advance.

The results of the workshop experience enabled us to refine activities for the online course, mainly by adding more support and tasks to provide a background and orientation to the issues of learner-centred design. We also realised how much more valuable an online course can be than an ephemeral face-to-face workshop which disappears without visible trace. The online course can be revisited and re-examined after further learning or application of learning has occurred. Fleeting ideas in a workshop, too soon gone because of the pace, can be explored in the online course. The advantages of face-to-face though cannot be denied – the time commitment is made and colleagues are there on hand for immediate discussion, however brief. It seems that commitment to an online course can be problematic for busy people because it is too easy not to set the time aside (Forsyth, 2001).

We also utilised the services of Darren Fittler, a law student who is blind, and an experienced Internet user. This proved to be a highly engaging time for the workshop participants. Darren was a first-time user of WebCT and went through his allotted tasks (of which he had no prior information), speaking his thoughts out loud, and that gave a powerful message with respect to learner-centred design. We felt we had to capture that and incorporate it into the online course. He was later videoed going through it all again in a studio setting. If we had not had the experience of the face-to-face workshop with Darren we would probably not have thought of including him online.

Multipurpose Course Design

The issue of the dual purpose of the online course (part of a postgraduate degree, and staff development), and its effect on the inclusion of assessment strategies, was resolved essentially by giving the assessment criteria different purposes. For academic staff, doing the course out of interest or personal development, the assessment criteria can be used simply as a guide to learning. This obviated having to develop two separate courses, one with and one without assessment. Extra instructions and clarification had to be repeated for every activity page on the website because the course can be dipped into at any place by staff and being confronted with unexpected assessment may prove a barrier to engagement.

Design Features of the Online Course

Since learner-centred design is a core concern of the online course, some of those design features are noted here.

- The Home page has text and icon (with alt-tags) links to all the important elements of the course.
- High contrast text and background are used throughout, and no unnecessary graphics or icons are used.
- On the Home page there are tips for accessibility, e.g., for people using a screen reader to hide the left navigation bar which adds unnecessary complexity to the page.
- The tip also includes a link to downloading the Adobe Acrobat Reader 5 to enable suitably formatted PDF documents to be read by a screen reader.
- The use of PDF has been avoided wherever possible, or alternative formats have been provided.
- The Welcome page provides tutor contact details, describes the course, its rationale, the activities, assessment portfolio, and invites constant feedback/evaluation of the course.
- The aims, objectives and learning outcomes are visible from the Home page.
- A link to other parts of the course is provided wherever they are mentioned, and that link opens in a new window to enable easy return (closing the window).
- Links are provided directly to any particular discussion topic rather than just to the discussion area which would require further searching to find the specific relevant topic.
- A schedule is provided of tasks, their content, deliverables (particularly if the course is assessable) and an indication of how much time should be allocated to each task. This time allocation is a suggestion only in that personal interests and different learning styles will result in different times being spent on the tasks.
- An orientation activity is provided for easing new online learners into the environment, and to enable course participants to meet each other and to comment on each other's interests. Practice is also provided in uploading a file to the student presentation area, with tutor contact details immediately to hand in case of difficulties.
- Each of the activities is developed as self-contained (to minimise searching other documents for relevant information) with introduction, task, reporting, discussing, assessment criteria (for those being assessed), and resources being provided.
- A direct link to assessment is also provided on the Home page.
- A link to resources, including links to relevant free software downloads, is available from the Home page.
- The videos include either subtitles or a text transcript.

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